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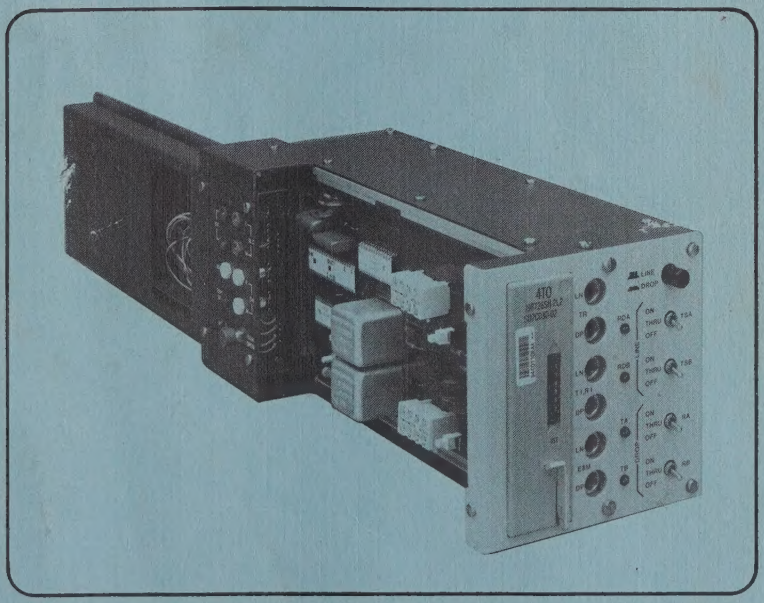
431A

CHANNEL UNIT EXTENDER TEST SET

OPERATION MANUAL

431A-2 SHOWN WITH THE CHANNEL UNIT INSERTED



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Sierra®
A DIVISION OF LEAR SIEGLER, INC.

SIERRA 431A-1 and 431A-2
CHANNEL UNIT EXTENDER TEST SETS
OPERATION MANUAL

CONTENTS

		Page
1.	GENERAL INFORMATION	3
	Introduction	3
	Application of Test Set	4
	Functional Description	4
2.	OPERATION	11
	Introduction	11
	Receiving Information	11
	Customer Service	11
	Power Requirements	11
	Installation	11
	Signaling Tests	12
	V.F. Tests (Transmit Side)	13
	V.F Tests (Receive Side)	15
3.	PHYSICAL DESCRIPTION	17
	General Appearance	17
	Test Probe	18
	Controls, Connectors and Indicators	18
4.	TECHNICAL DATA	27
5.	MAINTENANCE	29
	General	29
	Repair Information	29
	Cleaning	29
	Parts and Accessories	30

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1. GENERAL INFORMATION

INTRODUCTION

1.1 The Sierra 431A Test Set incorporates several test functions in one specialized instrument. It can be used in place of four pieces of standard test equipment: (1) Signaling Path Test Set (SPTS), (2) Channel Unit Extender, and (3) D3/D4 Portable Test Set with (4) Channel Access Unit (CAU).

The 431A comes in two versions: the 431A-1 measures actual levels; the 431A-2 is normalized to the VF line level. This manual provides information for the 431A-1 and the 431A-2.

SPTS Functions - Monitors and displays the received A & B signaling bits from the common equipment (CE). Provides switches for user to establish the transmit signaling status into the common equipment. A second set of indicators displays the transmit A & B signaling bits from the channel unit (CU) under test. Provides a second set of switches to control the receive signaling status of the channel unit under test. In addition, the 431A has a THRU position on these switches which passes the A & B signaling bits directly between the common equipment (CE) and the channel unit (CU), making the test set electrically transparent.

Channel Unit Extender - Replaces the channel unit in the shelf slot. Provides a jack field for access to the line and drop side of the receive and transmit signals and the E and M signals. Provides mounting for the channel unit with easy access to its circuitry.

D3/D4 Portable Test Set Functions with Channel Access Unit (CAU) - Provides connection points for the transmit and receive signals when used with a Sierra 808D or equivalent external analog test set. Provides an oscillator for insertion of a tone into the signal path. Provides a jack to measure signals coming from the channel unit and a jack for the insertion of a tone from an external oscillator.

APPLICATION OF TEST SET

1.2 The Sierra 431A Test Set provides a compact means of testing the receive and transmit operation of any given channel unit in either SLC-96* systems or D4 channel banks. The 431A provides access to the drop side VF circuits and to the internal VF test points of the channel units. It also provides access to the E&M circuit and to the A and B signaling bits.

FUNCTIONAL DESCRIPTION

1.3 General System Information - The D4 Channel Banks and the SLC-96 System are both designed to convert multiple channels of voice frequency signals into T-carrier digital pulse streams.

With respect to each channel unit, the direction toward the voice frequency (VF) cable-pair is known as the DROP side and the direction toward the T-carrier line is known as the LINE side.

* Trademark of the AT & T Technologies.

Function of Sierra 431A - The 431A is primarily designed to test the receive and transmit operation of any given channel unit. Access is provided to the drop-side cable pairs in both the LINE and DROP directions. Access is also provided to the internal VF test points within the channel unit, so that gain or attenuation between the test points and the cable pairs can be measured. These measurements can be made on both the transmit and receive sections of the channel unit.

When the VF signal path is broken, a tone is available to insert at a known reference level. This permits completion of the signal circuit for monitoring down-line operation.

Functional Diagrams - As an aid to understanding the operation of the 431A, refer to the functional diagrams. The 431A-1 is shown in Fig. 1-1 (p. 9) and the 431A-2 is shown in Fig. 1-2 (p. 10).

VF Circuit Testing - For VF circuit testing the 431A requires an external levelmeter connected to the EXT DET jack.

The 431A provides an internal signal source at 1004 Hz with an output level at -8.5 dBm for measurements at the transmit TLP of the channel unit and at +4.0 dBm for measurements at the receive TLP of the channel unit.

> NOTE: Setting of the LINE/DROP pushbutton switch controls the direction of the signal in the 431A.

If the user desires a signal source with a different level or frequency, an external source can be connected to the EXT OSC jack. When a plug is inserted in this jack, the internal source is disconnected.

The 431A-1 requires the input at the EXT OSC jack of the actual levels applied at the TLPs in the Channel Unit (CU). For example, if the user desires a level of -10.0 dBm at the transmit TLP of the channel unit, then -10.0 dBm should be inserted into the EXT OSC jack and the LINE/ DROP pushbutton set to LINE. If the user desires a level of -10.0 dBm at the receive TLP of the channel unit, then -10.0 dBm should be inserted into the EXT OSC jack and the LINE/DROP pushbutton switch set to DROP.

The 431A-2 is normalized to the VF line level. The signal travels through amplifiers and acquires a positive or negative gain in level to correspond to the TLPs in the Channel Unit (CU). For example, if the user desires a level of -10.0 dBm at the transmit TLP of the channel unit equipment, then -1.5 dBm should be inserted into the EXT OSC jack and the LINE/ DROP pushbutton switch set to LINE. If the user desires a level of -10.0 dBm at the receive TLP of the channel unit, then -14.0 dBm should be inserted in the EXT OSC jack and the LINE/DROP pushbutton switch set to DROP.

Use of the Test Probe - In VF testing the 431A uses a test probe which is inserted into the channel unit (CU) under test. The probe, together with the internal circuitry of the 431A, allows two selections of test configuration by operating the LINE/DROP pushbutton switch on the front panel.

Pushbutton Switch in LINE Position - The 431A is configured to test the Pulse Amplitude Modulation (PAM) sections of the channel unit. The levelmeter will read the VF output of the RPAM, and the signal source is connected to supply the selected tone into the VF input of the TPAM.

Pushbutton Switch in DROP Position - The 431A is configured to test the performance of the transmit and receive VF paths through the channel unit. An external signal source of known level can be inserted into the VF input to measure the level through the VF transmit path. Also, the internal signal source can be used to measure the level through the VF receive path.

Testing the Signaling Information - The A and B signaling bit information, which is ordinarily connected directly into the channel unit when it is in the shelf, is brought to the front panel of the 431A. The information from both the channel unit and from the channel bank is displayed by indicator lights. Toggle switches on the front panel of the 431A permit the selection of the status of both A and B bits to be indicated into the channel unit and into the channel bank. In addition, these toggle switches also have a THRU position which permits passing the signaling information directly into the channel unit, as occurs when it is in the shelf.

The E/M circuit passes through the 431A and is brought to the front panel at two 310 jacks, permitting access in either the LINE or DROP (D4) direction. Additional pin jacks allow access to both SLC-96 and D4 E&M lines. A normally closed pushbutton switch, E&M OPEN, opens the E&M lines to connect the jacks only to the line side.

Other Test Points - There are nine circuit-access test points on the side of the 431A. These are:

E-SLC, M-SLC, E-D4, M-D4, SX-T, SX-T1, 20 HZ, 20 HZ GRD, and -48V

These test points are described on pages 25 and 26 in Table 3-1 and Fig. 3-4.

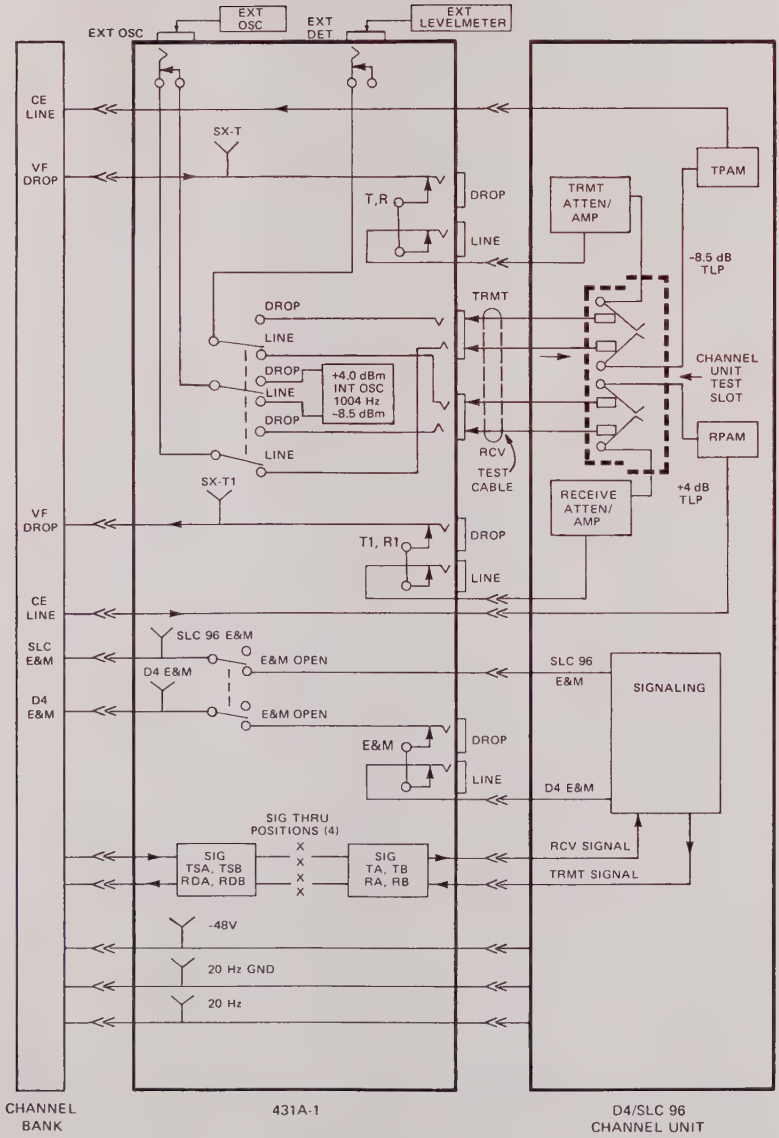

Fig. 1-1
431A-1 Functional Diagram

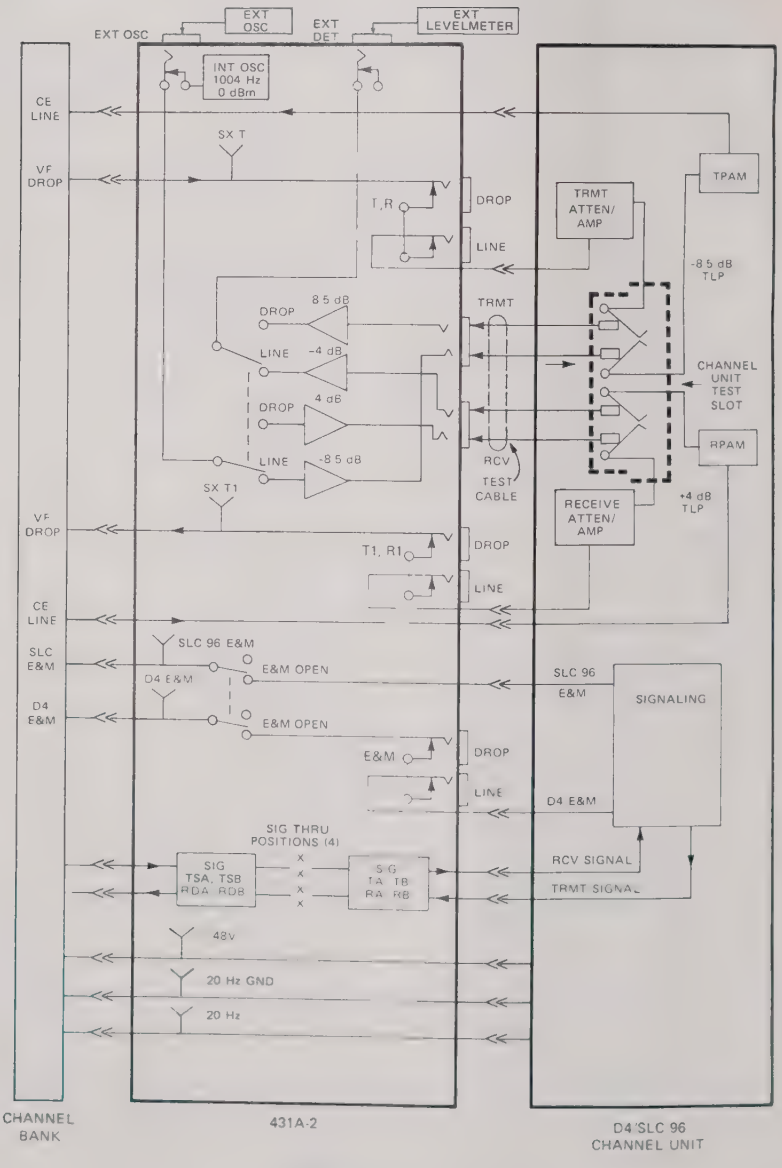

Fig. 1-2
431A-2 Functional Diagram

2. OPERATION

INTRODUCTION

2.0 The 431A is available in two versions: the 431A-1 measures actual levels; the 431A-2 is normalized to the VF line level. This section provides operational information for both units.

RECEIVING INFORMATION

2.1 When the test set is received, unpack and inspect it carefully. Check the equipment received against the order.

The 431A Channel Unit Extender Test Set is furnished with a test probe which has an attached cable and plug (Sierra Part Number C03512300).

CUSTOMER SERVICE

2.2 If the test set is found to be damaged or does not operate properly, or if the contents of the shipment are not complete, contact the Sierra Customer Service Department (see Section 5).

POWER REQUIREMENTS

2.3 The 431A draws its power from the channel unit slot. DC voltages used are -12 V, +12 V, +5 V.

INSTALLATION

2.4 Channel Unit Extender and Channel Unit - Identify the channel unit (CU) to be tested and remove it from the shelf slot. Insert the extender portion of Sierra 431A into the shelf slot, being sure it is fully seated. Insert the channel unit (CU) into the 431A.

Test Probe - For VF testing connect test probe to TRMT and RCV jacks on bottom of 431A and to the TST connector on the front of the channel unit (CU) under test.

In using the probe, be sure to seat the dual 310 plug such that the serrated edge (TRMT side) is toward the front. Also be sure the contact finger board is inserted in the TST connector on the front of the channel unit with the cord on the left.

NOTE: If making noise tests using the 431A, the internal oscillator must be turned OFF:

1. Remove channel unit from the 431A.
2. Locate the toggle switch S6 on the 431A control board (A2 board). When facing the board, the switch is in the upper left corner.
3. Set S6 to the OFF position.

SIGNALING TESTS

2.5 Signaling tests are conducted without the use of the test probe. Direct access to the D4 E/M circuits is available on the front panel of the 431A; use LN (LINE) jack or DP (DROP) jack, as needed.

Read status of received signaling bits A and B from common equipment (CE) on indicators RDA and RDB. Readings which do not correlate with the far end signaling status indicate faulty operation in the common equipment or the channel bank.

Set status of transmitted signaling bits A and B into common equipment (CE) using switches TSA and TSB. If the E relay at the far end does not respond to the signaling commands, this may indicate faulty operation in the common equipment or the channel bank.

Read status of transmitted signaling bits A and B from channel unit (CU) under test on indicators TA and TB. Readings which do not correspond with the drop side condition may indicate faulty operation in the channel unit under test.

Set status of received signaling bits A and B toward channel unit (CU) under test using switches RA and RB. If the E relay in the channel unit under test does not respond to the signaling commands, this indicates faulty operation in the channel unit.

To pass signaling information directly from common equipment (CE) to channel unit (CU), set all toggle switches to the THRU position.

V.F. TESTS (ANALOG TESTS) ON TRANSMIT SIDE

2.6 The test probe is used during VF testing and when it is in place, the circuit of the transmit side is broken at the -8.5 dBm Test Level Point (TLP) within the channel unit (CU) under test. Both parts of the circuit are accessed with the test probe. Level readings can be taken on the VF path and a known signal can be inserted into the Transmit Pulse Amplitude Modulation (TPAM) circuit.

VF Circuit Performance

Step 1 Connect a patch cord from the TR LN jack on the 431A front panel to a VF oscillator (Sierra 808D or similar).

Step 2 Connect a patch cord from the EXT DET jack on the 431A bottom panel to a levelmeter (Sierra 808D or similar).

Step 3 Set the VF oscillator for desired output.

Step 4 Set the LINE/DROP pushbutton switch on the 431A front panel to the DROP position.

Step 5 Read levelmeter. Using the input from the VF oscillator as a reference, levelmeter readings show the transmit VF gain or attenuation within the channel unit.

Transmit Signal Insertion

Step 1 The 431A transmit TLP (test level point) is at -8.5 dBm, which is supplied by an internally generated signal at 1004 Hz. If desired, a different frequency and/or level (+10.0 dBm max.) can be inserted at the EXT OSC jack on the bottom panel. With a plug in this jack, the internal 1004 Hz signal is disconnected.

For the 431A-1: To provide -8.5 dBm at TLP, apply a -8.5 dBm input level at the EXT OSC jack.

For the 431A-2: To provide -8.5 dBm at TLP, apply a 0 dBm input level at the EXT OSC jack.

Step 2 Set the LINE/DROP pushbutton switch on the 431A front panel to the LINE position.

Step 3 The known signal is now supplied to the input of the TPAM circuits for use in testing the digital circuits.

V.F. TESTS (ANALOG TESTS) ON RECEIVE SIDE

2.7 The test probe is used during VF testing and when it is in place, the circuit of the receive side is broken at the +4.0 dBm Test Level Point (TLP) within the channel unit (CU) under test. Both the transmit and the receive paths of the circuit are accessed with the test probe. Level readings can be taken on the VF path. The level of the output of the Receive Pulse Amplitude Modulation (RPAM) circuit can also be measured.

VF Circuit Performance

Step 1 The 431A receive TLP (test level point) is at +4.0 dBm, which is supplied by an internally generated signal at 1004 Hz. If desired, a different frequency and/or level (+10.0 dBm max.) can be inserted at the EXT OSC jack on the bottom panel. With a plug in this jack, the internal 1004 Hz signal is disconnected.

Step 2 Connect a patch cord from one of the LN jacks on the 431A front panel to a levelmeter (Sierra 808D or similar). On a 2-wire channel unit, use the TR LN jack; on a 4-wire unit, use T1, R1 LN.

Step 3 Set the LINE/DROP pushbutton switch on the 431A front panel to the DROP position.

Step 4 Read levelmeter. Using the input from the VF oscillator as a reference, levelmeter readings show the receive VF gain or attenuation within the channel unit.

RPAM Output Level

Step 1 Establish a signal into the RPAM circuit from the common equipment of known frequency and level. (Connect a VF oscillator at the distant end.)

Step 2 Connect a patch cord from the EXT DET jack on the 431A bottom panel to a levelmeter (Sierra 808D or similar).

Step 3 Set the LINE/DROP pushbutton switch in the 431A front panel to the LINE position.

Step 4 Read levelmeter. Using the known signal input to the RPAM as a reference, levelmeter readings show the VF performance of the RPAM.

For the 431A-1: To verify a +4.0 dBm RPAM TLP, the levelmeter should read +4.0 dBm at the EXT DET jack.

For the 431A-2: To verify a +4.0 dBm RPAM TLP, the levelmeter should read 0 dBm at the EXT DET jack.

3. PHYSICAL DESCRIPTION

GENERAL APPEARANCE

3.1 A general view of the Sierra 431A is shown in Fig. 3-1. The test set box is nearly 5" square and, when positioned in the bay for testing, projects approximately 11½" from the face of the relay rack. The back of the 431A has a 10" extender which is inserted into the slot for the channel unit under test. The channel unit itself is inserted into the front of the 431A, which is arranged for easy access to the circuitry of the channel unit. [Fig. 3-1 shows a typical channel unit in place.]

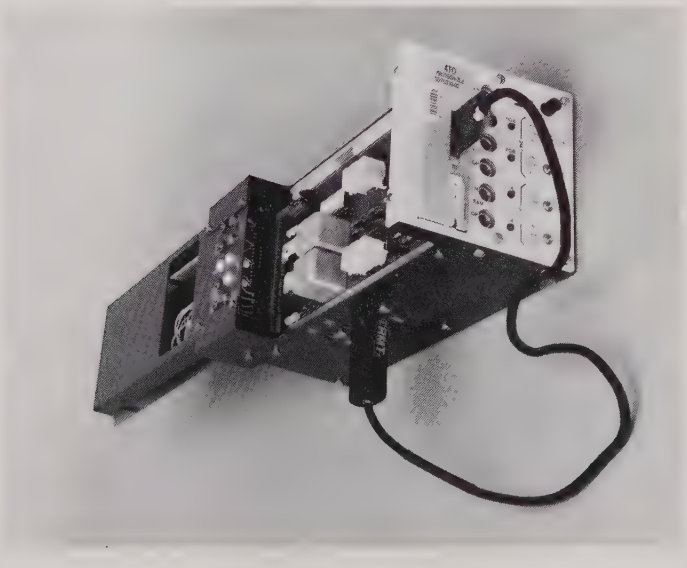

Fig. 3-1
431A Channel Unit Extender Test Set

TEST PROBE

3.2 The Sierra 431A is furnished with a test probe (Sierra part number C03512300) which is used in VF testing on channel units. The probe consists of a multi wire cord, approximately 24" long, with a dual 310 plug on one end and a p.c. board with contact fingers on the other.

CONTROLS, CONNECTORS AND INDICATORS

3.3 The various operating panels of the 431A are shown in the following figures: Fig. 3-2, front panel; Fig. 3-3, bottom panel; Fig. 3-4, side panel. Each item on each panel is marked with an item number which is described in Table 3-1.

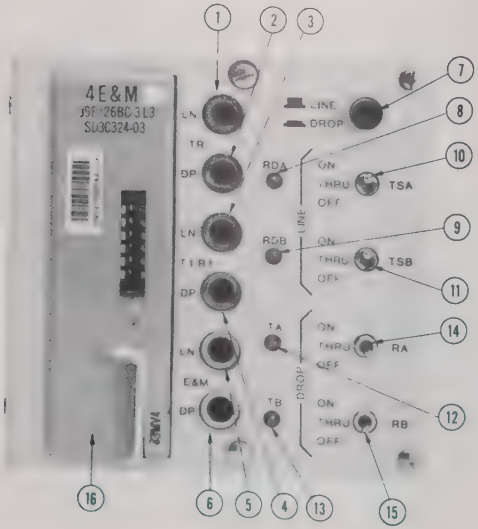

Fig. 3-2
Front Panel

TABLE 3-1
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	FRONT PANEL (Fig. 3-2)	
1	TR LN (T/R LINE) jack	Allows access to the transmit and receive VF circuit toward the line side on 2-wire channel units, and to transmit only on 4-wire channel units. Opens the circuit from the drop side.
2	TR DP (T/R DROP) jack	Allows access to the transmit and receive VF circuit from the drop side on 2-wire channel units, and to receive only on 4-wire channel units. Opens the circuit toward the line side.
3	T1,R1 LN (T1/R1 LINE) jack	Allows access to the receive VF circuit from the line side on 4-wire channel units. Opens the circuit toward the drop side.

table continued

TABLE 3-1 (Continued)
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	FRONT PANEL (Fig. 3-2) (Continued)	
4	T1,R1 DP (T1/R1 DROP) jack	Allows access to the transmit VF circuit toward the drop side on 4-wire channel units. Opens the receive circuit from the line side.
5	E&M LN (E/M LINE) jack	Allows access to the signals at the line side on D-4 4-wire E&M circuits only. Opens the E & M drop side. (Not useable with D4CE800.)
6	E&M DP (E/M DROP) jack	Allows access to the signals at the drop side on D-4 4-wire E&M circuits only. Opens the E & M line side. (Not useable with D4CE800.)
7	LINE/DROP push-button switch	Button Out - Connects VF oscillator and detector to line side of test-probe circuit. Button In - Connects VF oscillator and detector to drop side of test-probe circuit.

table continued

TABLE 3-1
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	FRONT PANEL (Fig. 3-2) (Continued)	
8	LINE RDA lamp	Indicates status of the receive signaling bit A. ON = Logic 1; OFF= Logic 0.
9	LINE RDB lamp	Indicates status of the receive signaling bit B. ON = Logic 1; OFF= Logic 0
10	LINE TSA switch	Sets transmit signaling bit A. ON = Logic 1; OFF= Logic 0 THRU passes bit A from CE to CU.
11	LINE TSB switch	Sets transmit signaling bit B. ON = Logic 1; OFF= Logic 0 THRU passes bit B from CE to CU.
12	DROP TA lamp	Indicates status of the transmit signaling bit A. ON = Logic 1; OFF= Logic 0

table continued

TABLE 3-1 (Continued)
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	FRONT PANEL (Fig. 3-2) (Continued)	
13	DROP TB lamp	Indicates status of the transmit signaling bit B. ON = Logic 1; OFF= Logic 0
14	DROP RA switch	Sets receive signaling bit A. ON = Logic 1; OFF= Logic 0 THRU passes bit A from CU to CE.
15	DROP RB switch	Sets receive signaling bit B. ON = Logic 1; OFF= Logic 0 THRU passes bit B from CU to CE.
16	Channel Unit Well	Test set well for insertion of channel unit under test (CU). [Fig. 3-1 shows a typical channel unit in place.]

table continued

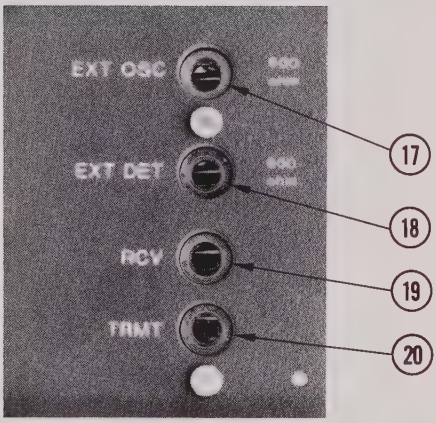

Fig. 3-3
Bottom Panel

table continued

TABLE 3-1 (Continued)
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	BOTTOM PANEL (Fig. 3-3)	
17	EXT OSC jack	Connection point for external oscillator. (+10.0 dBm max.) Internal 1004 Hz oscillator is disabled when jack is inserted.
18	EXT DET jack	Connection point for external level meter.
19	RCV jack*	Test probe connection point for receive circuits of channel unit.
20	TRMT jack*	Test probe connection point for transmit circuits of channel unit.

*NOTE: RCV and TRMT jacks are normally accessed by the dual 310 plug of the 431A test probe.

table continued

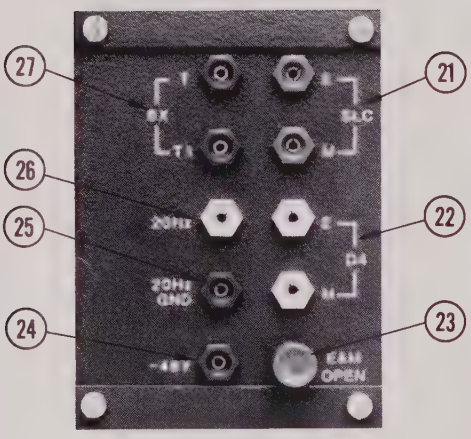

Fig. 3-4
431A Side Panel

TABLE 3-1
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	431A SIDE PANEL (Fig. 3-4)	
21	E&M SLC jacks	Allow access to the SLC-96 E&M line.
22	E&M D4 jacks	Allow access to the D4 E&M line.

table continued

TABLE 3-1 (Continued)
CONTROLS, CONNECTORS AND INDICATORS

Item	Name	Function
	431A SIDE PANEL (Fig. 3-4)	
23	E&M OPEN pushbutton	Normally closed, this pushbutton switch allows the E&M leads to be momentarily opened if required. (The SLC E&M jacks and the D4 E&M jacks are on the channel bank side of this switch.)
24	-48V jack	Allows access to the office battery voltage.
25	20 Hz GND jack	Allows access to the ground line for BUSY and 20 Hz tests.
26	20 Hz jack	Allows access to the ringing circuit by way of a 1470 Ohms resistor.
27	T & T1 SX jacks	Allow access to measure a DC simplex voltage.

4. TECHNICAL DATA

431A-1 TRANSMIT TEST CIRCUIT

Level of Internal Oscillator at TRMT jack	-8.5 ±0.1 dBm
Gain from External Oscillator to TRMT jack	0.0 ±0.1 dB
Gain from TRMT jack to EXT DET jack	0.0 ±0.1 dB

431A-1 RECEIVE TEST CIRCUIT

Level of Internal Oscillator at RCV jack	+4.0 ±0.1 dBm
Gain from External Oscillator to RCV jack	0.0 ±0.1 dB
Gain from RCV jack to EXT DET jack	0.0 ±0.1 dB

431A-2 TRANSMIT TEST CIRCUIT

Level of Internal Oscillator at TRMT jack	-8.5 ±0.1 dBm
Gain from External Oscillator to TRMT jack	-8.5 dB ±0.1 dB
Gain from TRMT jack to EXT DET jack	+8.5 dB ±0.1 dB

431A-2 RECEIVE TEST CIRCUIT

Level of Internal Oscillator at RCV jack	+4.0 ±0.1 dBm
Gain from External Oscillator to RCV jack	+4.0 ±0.1 dB
Gain from RCV jack to EXT DET jack	-4.0 ±0.1 dB

TECHNICAL DATA (continued)

VF OSCILLATOR	
Internal Oscillator:	
Frequency	1004 ±1 Hz
431A-1 Levels	+4.0 and -8.5 dBm
431A-2 Level	0 dBm
External Oscillator:	
Level	+10.0 dBm maximum
Input Impedance at EXT OSC jack	600 ohms
DETECTOR	
Amplifier Gain	0.0 dB
Output Impedance at EXT DET jack	600 ohms
JACKFIELD (type 310 jacks)	
Impedance Level	600 ohms
POWER REQUIREMENTS	
DC Power is drawn from Channel Unit Bay	-12V, +12V, +5V 30 mA, 80 mA, 60 mA max. max. max.
ENVIRONMENTAL RANGE	
Operating	0°C to +50°C (32°F to 122°F)
MECHANICAL REQUIREMENTS	
Overall Dimensions (Maximum):	
Length	21½ in (54½ cm)
Width	5 in (12.7 cm)
Height	5 in (12.7 cm)
Extension from Face of Relay Rack when in use	11½ in (29 cm) (approx.)
Weight (including probe)	4.1 lb (1.9 kg)

5. MAINTENANCE

GENERAL

5.1 The Sierra 431A has no fuses or replaceable light bulbs. Operator maintenance is limited to keeping the test set clean.

REPAIR INFORMATION

5.2 If the 431A malfunctions and the difficulty cannot be readily identified, the test set should be returned for repair. Contact Sierra Customer Service:

ADDRESS: Customer Service Department
Lear Siegler, Inc.
Sierra Electronic Division
3885 Bohannon Drive
Menlo Park, California 94025
Telephone: (415) 321-5374
TWX: 910-373-1282

When an instrument is to be returned for repair or servicing (whether under warranty or not), obtain packing and shipping instructions, and a Return Authorization Number (RA No.) from the Customer Service Department before shipping the test set. IMPORTANT: Please include a written description of the trouble with the instrument when shipping it for service or repair.

CLEANING

5.3 The instrument can be cleaned with a mild soap solution and a soft cloth. Before cleaning the test set, squeeze the cloth after dipping it in the solution. Be careful not to moisten any wiring or electrical parts. Do not submerge the test set in the solution. Use another cloth to wipe dry after cleaning.

PARTS AND ACCESSORIES

5.5 When first shipped from the factory, the 431A includes a test probe. If needed, a replacement is available. Also, there is an optional carrying case which may be ordered separately. One of the power board assemblies can be replaced by the user and the part number is provided below.

Item	Sierra Part Number
Replacement Test Probe	C03512300
Carrying Case	921000098
A1 PWB Assembly (user replaceable)	C03596500

Fig. 5-1
431A with Optional Carrying Case

WARRANTY

SIERRA ELECTRONIC DIVISION, LEAR SIEGLER, INC. warrants products manufactured by it to be free from defects in material and workmanship and to meet the applicable specifications under normal use and service for a period of 12 months from the date of original shipment by us. Our obligation under this warranty is limited to the repair or replacement of such products which, after having been returned to the factory or a point designated by us, shall be examined and in our sole opinion, found defective and that such defect was not induced by causes external to the product. Alternately, SIERRA may elect to issue credit for any such defective product. All products to be repaired or replaced shall be returned prepaid to the designated place of repair in accordance with authorization and packing and shipping instructions issued by SIERRA. Return shall not be made until such authorization and instructions are issued. Each returned product shall be accompanied by a statement or report fully stating the claimed defects and any other pertinent information concerning the failure.

SIERRA's responsibility under this warranty does not apply to any products which have been repaired, worked upon or altered by persons not authorized by us so as to in our sole judgement, injure the stability or reliability of such product, or which have been subject to misuse, negligence or accident, or where applicable, the serial number has been altered, effaced or removed. SIERRA shall not be liable for damages resulting from the use of the purchased product, nor shall SIERRA be responsible for any failure in the performance of other items to which the purchased product is connected or the functioning of an entire system or parts of any system of which the purchased product may be a part.

SIERRA reserves the right to make changes in the design or construction of any of its products at any time without incurring any obligation to make changes whatever on units previously purchased. Accessories, including but not limited to all vacuum tubes, fuses, pilot lamps and batteries used with our products are not covered by this warranty. A test setup charge of $100.00 will apply to any returned instrument or microwave component which, after test, is found to meet the applicable specifications.

This warranty is in lieu of all other warranties, expressed, implied or statutory. No representative or person is authorized to represent nor assume for SIERRA any liability in connection with the sale of products other than set forth herein. IN NO EVENT SHALL SIERRA BE LIABLE FOR SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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Information contained herein is subject to change since LSI/Sierra Electronic Division reserves the right, without notice, to make changes in equipment design or components as progress in engineering or manufacturing methods may warrant.

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